Claims:

1. (Original) A per-pixel graphics processing unit for use in a system for lighting a plurality of polygon surfaces in a rendering system, the graphics processing unit comprising:

a. dedicated hardware logic operable to perform a sequence of lighting calculations that generate per-pixel lighting equation lighting coefficients for a plurality of the drawn pixels; and

b. per-pixel user programmable hardware logic communicating with the dedicated hardware logic to receive the per-pixel lighting coefficients and perform additional shading calculations using the lighting coefficients.

2. (Original) The graphic processing unit of claim 1 wherein the dedicated hardware logic communicates with the programmable hardware logic through one or more shared registers.

3. (Original) The graphic processing unit of claim 1 wherein the dedicated hardware logic comprises logic that uses the lighting coefficients in the calculation of a color value.

4. (Original) The graphic processing unit of claim 1 wherein the dedicated hardware logic includes a vector generation unit that receives vertex values for the polygon surfaces and calculates a 3-dimensional, unit-length surface normal vector.

5. (Original) The graphic processing unit of claim 4 wherein the vector generation unit calculates a 3-dimensional, unit-length view reflection vector.

6. (Original) The graphic processing unit of claim 1 wherein the dedicated hardware logic includes a point light unit that calculates normalized point light vectors.

7. (Original) The graphic processing unit of claim 6 wherein the point light unit calculates scalar distance coefficients.

8. (Original) The graphic processing unit of claim 1 wherein the dedicated hardware logic includes a vector shading unit that performs vector dot product operations.

9. (Original) The graphic processing unit of claim 8 wherein the vector shading unit performs color scaling operations.

10. (Original) The graphic processing unit of claim 4 wherein the vector generation unit receives a bump map vector and combines the bump map vector with the normal vector to produce a composite surface angle vector.

11. (Original) The graphic processing unit of claim 4 wherein the vector shading unit receives eye vector information and generates a view reflection vector therefrom.

12. (Original) The graphic processing unit of claim 1 further comprising a texture memory communication with the programmable hardware logic.

13. (Original) A per-pixel graphics processing unit for use in a system for lighting a plurality of polygon surfaces in a rendering system, the graphics processing unit comprising:

a. dedicated hardware logic operable to perform a sequence of lighting calculations that generate per-pixel specular lighting value coefficients for a plurality of the drawn pixels; and

b. per-pixel user programmable hardware logic communicating with the dedicated hardware logic to receive the per-pixel lighting coefficients and perform additional shading calculations using the specular lighting value coefficients.

14. (Original) The graphic processing unit of claim 13 wherein the dedicated hardware logic communicates with the programmable hardware logic through one or more shared registers.

15. (Original) The graphic processing unit of claim 13 wherein the dedicated hardware logic comprises logic that uses the lighting coefficients in the calculation of a color value.

16. (Original) The graphic processing unit of claim 13 wherein the dedicated hardware logic includes a vector generation unit that receives vertex values for the polygon surfaces and calculates a 3-dimensional, unit-length surface normal vector.

17. (Original) The graphic processing unit of claim 16 wherein the vector generation unit calculates a 3-dimensional, unit-length view reflection vector.

18. (Original) The graphic processing unit of claim 13 wherein the dedicated hardware logic includes a point light unit that calculates normalized point light vectors.

19. (Original) The graphic processing unit of claim 18 wherein the point light unit calculates scalar distance coefficients.

20. (Original) The graphic processing unit of claim 13 wherein the dedicated hardware logic includes a vector shading unit that performs vector dot product operations.

21. (Original) The graphic processing unit of claim 20 wherein the vector shading unit performs color scaling operations.

22. (Original) The graphic processing unit of claim 16 wherein the vector generation unit receives a bump map vector and combines the bump map vector with the normal vector to produce a composite surface angle vector.

23. (Original) The graphic processing unit of claim 16 wherein the vector shading unit receives eye vector information and generates a view reflection vector therefrom.

24. (Original) The graphic processing unit of claim 13 further comprising a texture memory communication with the programmable hardware logic.

25. (Original) A per-pixel graphics processing unit for use in a system for lighting a plurality of polygon surfaces in a rendering system, the graphics processing unit comprising:

a. dedicated hardware logic operable to perform a sequence of lighting calculations that generate per-pixel diffuse lighting value coefficients for a plurality of the drawn pixels; and

b. per-pixel user programmable hardware logic communicating with the dedicated hardware logic to receive the per-pixel lighting coefficients and perform additional shading calculations using the diffuse lighting value coefficients.

26. (Original) The graphic processing unit of claim 25 wherein the dedicated hardware logic communicates with the programmable hardware logic through one or more shared registers.

27. (Original) The graphic processing unit of claim 25 wherein the dedicated hardware logic comprises logic that uses the lighting coefficients in the calculation of a color value.

28. (Original) The graphic processing unit of claim 25 wherein the dedicated hardware logic includes a vector generation unit that receives vertex values for the polygon surfaces and calculates a 3-dimensional, unit-length surface normal vector.

29. (Original) The graphic processing unit of claim 28 wherein the vector generation unit calculates a 3-dimensional, unit-length view reflection vector.

30. (Original) The graphic processing unit of claim 25 wherein the dedicated hardware logic includes a point light unit that calculates normalized point light vectors.

31. (Original) The graphic processing unit of claim 30 wherein the point light unit calculates scalar distance coefficients.

32. (Original) The graphic processing unit of claim 25 wherein the dedicated hardware logic includes a vector shading unit that performs vector dot product operations.

33. (Original) The graphic processing unit of claim 32 wherein the vector shading unit performs color scaling operations.

34. (Original) The graphic processing unit of claim 28 wherein the vector generation unit receives a bump map vector and combines the bump map vector with the normal vector to produce a composite surface angle vector.

35. (Original) The graphic processing unit of claim 28 wherein the vector shading unit receives eye vector information and generates a view reflection vector therefrom.

36. (Original) The graphic processing unit of claim 25 further comprising a texture memory communication with the programmable hardware logic.

37. (Original) A per-pixel graphics processing unit for use in a system for lighting a plurality of polygon surfaces in a rendering system, the graphics processing unit comprising:

a. dedicated hardware logic operable to perform a sequence of lighting calculations including the calculation of a substantially normalized point light vector; and

b. per-pixel user programmable hardware logic communicating with the dedicated hardware logic to receive the substantially normalized point light vector and perform additional shading calculations.

38. (Original) The graphic processing unit of claim 37 further comprising point light data provided to the graphics processing unit.

39. (Original) The graphic processing unit of claim 38 wherein the point light data includes a surface position vector and point light position vector.

40. (Original) The graphic processing unit of claim 38 wherein point light data for multiple light sources is input into the graphics processing unit in order to produce multiple normalized point light vectors.

41. (Original) The graphic processing unit of claim 38 wherein the substantially normalized point light vectors for the multiple light sources are calculated in parallel.

42. (Original) The graphic processing unit of claim 38 wherein the dedicated hardware is operable to calculate a dot product.

43. (Original) The graphic processing unit of claim 38 wherein the substantially normalized point light vector includes a value that represents the intensity of the light at a surface point of a polygon surface.

44. (Original) A per-pixel graphics processing unit for use in a system for lighting a plurality of polygon surfaces in a rendering system, the graphics processing unit comprising:

a. dedicated hardware logic operable to perform a sequence of lighting calculations including the calculation of a surface normal vector; and

b. per-pixel user programmable hardware logic communicating with the dedicated hardware logic to receive the surface normal vector and perform additional shading calculations.

45. (Original) The graphic processing unit of claim 44 wherein the dedicated hardware logic communicates with the programmable hardware logic through one or more shared registers.

46. (Original) The graphic processing unit of claim 45 wherein the dedicated hardware logic includes a vector generation unit that receives vertex values for the polygon surfaces and calculates a 3-dimensional, unit-length surface normal vector.

47. (Original) The graphic processing unit of claim 45 wherein the vector generation unit calculates a 3-dimensional, unit-length view reflection vector.

48. (Original) A per-pixel graphics processing unit for use in a system for lighting a plurality of polygon surfaces in a rendering system, the graphics processing unit comprising:

a. dedicated hardware logic operable to perform a sequence of lighting calculations including the calculation of a reflection vector; and

b. per-pixel user programmable hardware logic communicating with the dedicated hardware logic to receive the reflection vector and perform additional shading calculations.

49. (Original) The graphic processing unit of claim 48 wherein the dedicated hardware logic communicates with the programmable hardware logic through one or more shared registers.

50. (Original) The graphic processing unit of claim 49 wherein the dedicated hardware logic includes a vector generation unit that receives vertex values for the polygon surfaces and calculates a 3-dimensional, unit-length surface normal vector.

51. (Original) The graphic processing unit of claim 50 wherein the vector generation unit calculates a 3-dimensional, unit-length view reflection vector.